Solid State Relays
SRP4–CC

Space-Saving Solid-State Relay

Description

The SRP4-CC Relays series delivers four solid-state relays in one compact package, offering a reliable and space-efficient solution for controlling multiple AC loads. Designed for simplicity and industrial-grade performance, it's ideal for applications where panel space is limited and durability is a must.

• 4 SSRs in One Package: Combines four independently controlled relays into a single panel-mount unit, simplifying installation and saving valuable space.
• Rugged SCR Output: Built with back-to-back SCRs for each channel, this relay series ensures long-term reliability under industrial resistive load conditions.
• Fast, Safe Wiring: Equipped with Fast-on terminals for quick connections and a standard package that fits easily into existing layouts.

Features & Benefits

FEATURES	BENEFITS
Compact 4-Pole Design	Saves panel space and reduces wiring complexity by combining four independent relays in one unit. Ideal for OEMs and integrators working with limited enclosure space.
Zero Cross Switching	Reduces electrical noise and minimizes voltage spikes during switching, enhancing overall system stability.
Compliance with International Standards (cЯUus, CE, UKCA)	Ensures that the Solid-State Relay (SSR) has undergone rigorous testing, providing enhanced safety and product quality.

Applications

- Multi-zone temperature control in industrial ovens.
- Heating element control in commercial cooking and steam generation equipment.
- Sterilization systems with independent heating circuits.
- Fuel pipeline heat tracing in extreme ambient environments.
- Space-constrained electrical panels in OEM heating applications.

Ordering Information

FOR HEATING CONTROL

CATALOG #	OUTPUT MAX CURRENT	OUTPUT VOLTAGE	OUTPUT SWITCHING STYLE	OUTPUT OVERVOLTAGE PROTECTION	INPUT VOLTAGE RANGE	COMPLIANCE
SRP4-CCDZL-025NF-N	25 A	240 V AC	Zero Cross	-	3-32 V DC	cЯUus, CE

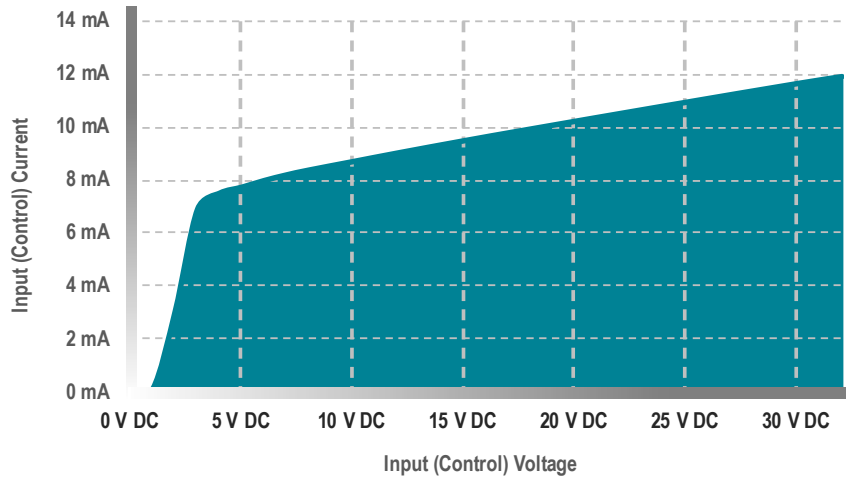
Revised: 08/22/2025

Input/Control Specifications[1]

GENERAL DATA					
SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
Uc	Input (Control) Voltage	-	Maximum	32	V DC
			Nominal	5 – 12 – 24	V DC
			Minimum	3	V DC
Urv	Reverse Voltage	-	Maximum	-30	V DC
Uc on	Turn-On Voltage (Pick-up/Engage/Activation Voltage)	-	Minimum	3.0	V DC
Uc off	Turn-Off Voltage (Drop Out/Release/Deactivation Voltage)	-	Nominal	1.0	V DC
Ic	Input (Control) Current	-	Maximum	12	mA
			Minimum	7	mA
-	Input Impedance	-	Nominal	Current Regulated	-
Ton	Turn-On Time	At nominal input voltage and f=5-Hz	Maximum	10	ms
Toff	Turn-Off Time	At nominal input voltage and f=5-Hz	Maximum	10	ms

Input Current vs Input Voltage Graphs (for power supply selection)
To ensure the Solid-State Relay (SSR) operates efficiently and reliably, it is essential to understand the relationship between input voltage and input current. The following input current graphs provide detailed information on the current consumption of our SSRs across the specified input voltage range (3-32 VDC). This data is crucial for selecting an appropriate power supply and ensuring the relay functions within its safe operating limits. Proper understanding of current consumption is vital for the optimal performance of your application.

3-32 VDC



Output/Load Specifications[1]

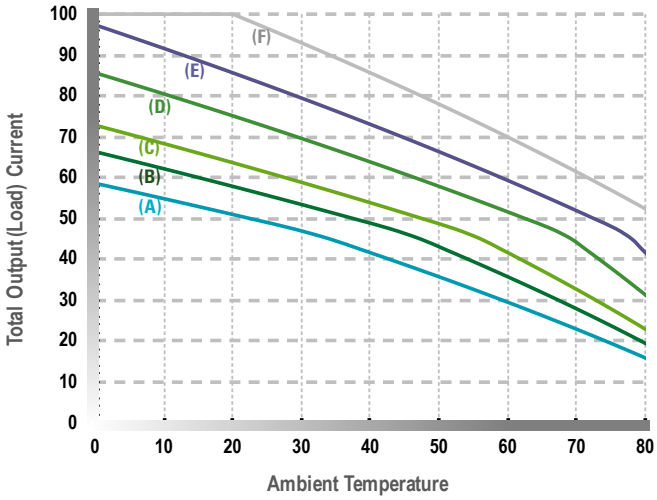
GENERAL DATA

SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
-	Output Configuration	-	-	SPST-NO	-
f	Operating Frequency	-	Minimum	47	Hz
			Nominal	50 – 60	
			Maximum	440	
Ue	Operating Voltage	-	Minimum	12	Vrms
			Nominal	120 - 240	
			Maximum	280	
Usync	Zero Cross Level (Zero Voltage Turn-on)	-	Maximum	25	V
Ua	Latching Voltage	At Ue Nominal	Minimum	8	V
V	On-State Voltage Drop	At Rated Current	Maximum	0.85 + 0.016 x Ie	Vrms
Vto	Threshold Voltage (Power Loss Calculations only)	Tvj = 125 °C	Maximum	0.85	V
rt	On state dynamic resistance (Power Loss Calculations only)	Tvj = 125 °C	Maximum	16.0	mΩ
Up	Transient Over-Voltage[2] (Peak/Blocking/Non-Repetitive Voltage)	-	Maximum	600	Vpk
Itsm	Transient Over-Current (Surge/Overload/Non-Repetitive Current)	Max 1 Cycle Tp = 10ms	Minimum	240	Apk
			Nominal	260	
Ilk	Leakage Current (Off-State)	At Rated Voltage	Maximum	1	mArms
dv/dt	Critical dV/dt (Off-State)	At Maximum Rated Voltage	Minimum	500	V/µsec
di/dt	Non-repetitive di/dt	-	Maximum	50	A/µsec
I^2t	I^2t Value for Fusing	½ Cycle at 50/60Hz (Tvj=45 °C)	Minimum	340	A^2 sec
			Nominal	288	
Pf	Minimum Power Factor	At Maximum Load	Minimum	0.8	-
Pd	Power Dissipation	@ Rated Current	Maximum	0.765 x Ie + 0.016 x Ie^2	W
Rthj/c	Thermal Resistance Junction to Case (Rjc)	-	Maximum	1.7	°C/W

The maximum continuous current value given in this datasheet is only for resistive loads (specifically AC-1 type), which are mainly used for heating control.

SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
Ie (AC-51)	Load Current (Continuous) – Heating Elements (AC-1)	Value per leg @ 20 °C	Maximum[3]	25	A DC
			Minimum	0.005	A DC

Thermal Derating Curves (for heatsink selection)
To operate the Solid-State Relay (SSR) at its specified ratings, the use of a heatsink is mandatory. The following thermal derating curves illustrate the maximum load current that our SSRs can manage under varying ambient temperatures and heatsink sizes. It is crucial to select a heatsink that is most suitable for your specific application.



(A) 1.5 °C/W: Heatsink **(C) 1 °C/W:** Heatsink **(E) 0.5 °C/W:** Heatsink
(B) 1.2 °C/W: Heatsink **(D) 0.7 °C/W:** Heatsink **(F) 0.3 °C/W:** Heatsink

Considerations - Switching Type
In applications requiring precise temperature management, solid-state relays (SSRs) play a crucial role. Specifically, the Zero Cross Switching type of SSR is commonly employed to regulate heaters based on signals from a temperature controller. This technology proves particularly valuable in scenarios where high-frequency switching occurs—such as when a heater cycles on and off frequently over short intervals for extended periods.

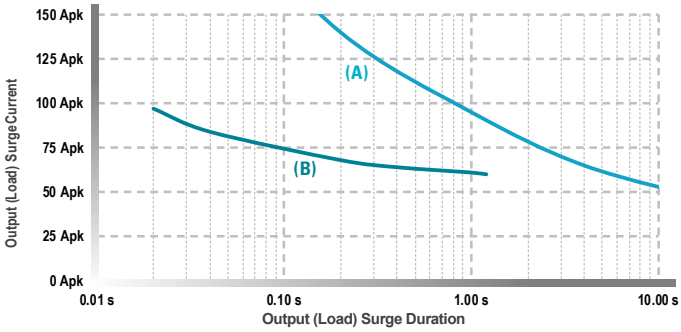
Considerations - Inrush Current
It's essential to recognize that variations exist between different types of heating elements, especially in hot or cold conditions. While it is generally expected that heating elements exhibit no inrush current, in certain heating elements cold conditions can lead to an inrush current equivalent to 1.4 times the nominal current. To mitigate this, we highly recommend oversizing the current rating and ensuring an appropriately sized heatsink. Doing so improves the relay's thermal endurance and extends its operational lifespan.

So, when selecting an SSR, consider using one with a capacity approximately 1.4 times that of the heater or operating the SSR at only 75%-80% of its maximum capacity. The following table provides guidance for choosing the right SSR for a specific heater load.

NOMINAL SSR CURRENT RATING	MAXIMUM RECOMMENDED HEATER CURRENT	HEATER POWER AT 120 VAC	HEATER POWER AT 240 VAC	HEATER POWER AT 400 VAC	HEATER POWER AT 480 VAC	HEATER POWER AT 600 VAC
25 A	20 A	2.4 KW	4.8 KW	8.0 KW	9.6 KW	12.0 KW

Output Surge Current Withstand Graphs (for transient protection)
To ensure the Solid-State Relay (SSR) can handle sudden increases in current without damage, it is essential to understand its surge current capacity. The following surge current graphs illustrate the maximum surge current that our SSRs can withstand over various durations. This information is crucial for selecting an SSR that can endure transient overcurrent events, ensuring the reliability and safety of your electrical system. Proper understanding of surge current capacity helps in preventing equipment failure and maintaining optimal performance in your application.

The graphs include a *Single Pulse Surge Current* curve used to define the protection offered by fuses, helping in the selection of appropriate protective devices. Additionally, is important to ensure that the *Repetitive Surge Current* curve is not exceeded during normal operation, as frequent overload currents can decrease the life expectancy of the SSR. Therefore, caution is advised to maintain the longevity and reliability of the SSR.



(A) Single Pulse Surge: Initial SSR internal temperature at **25°C** (cooler state from minimal or no operation).
(B) Repetitive Surges: Initial SSR internal temperature **70°C** (warmer state from continuous operation).

General Specifications[1]

GENERAL DATA					
SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
-	LED for Input (Control) Status Indicator	-	-	Continuously ON LED, when control input is applied	-
Ui	Isolation (Dielectric Strength)	Input to Output (50/60 HZ)	Nominal	4,000	Vrms
		Input/Output to Ground (50/60 HZ)	Nominal	2,500	
Ri	Insulation Resistance	@ 500 V DC	Minimum	1	GΩ
-	Coupling Capacitance	Input / Output	Maximum	0.8	pF
Uimp	Impulse Withstand Voltage	-	Nominal	4,000	Vrms
-	Short Circuit Current Rating (SCCR)	-	-	5	kA
-	Endurance according to American Standard UL508		Typical	6,000	Cycles
-	MTTFd (Mean Time to Dangerous Failure) (Calculated in accordance with the guidelines for safety-related parts of control systems, as specified by the international standard ISO 13849-1)	-	-	73	Years
-	MTBF[3] (Mean Time Between Failures) (Calculated in accordance with the Military Handbook Guidelines for Reliability Prediction of Electronic Equipment, as specified by the US Department of Defense Standard MIL-HDBK-217)	@ 40°C ambient	-	22	Years
		@ 60°C ambient	-	16	

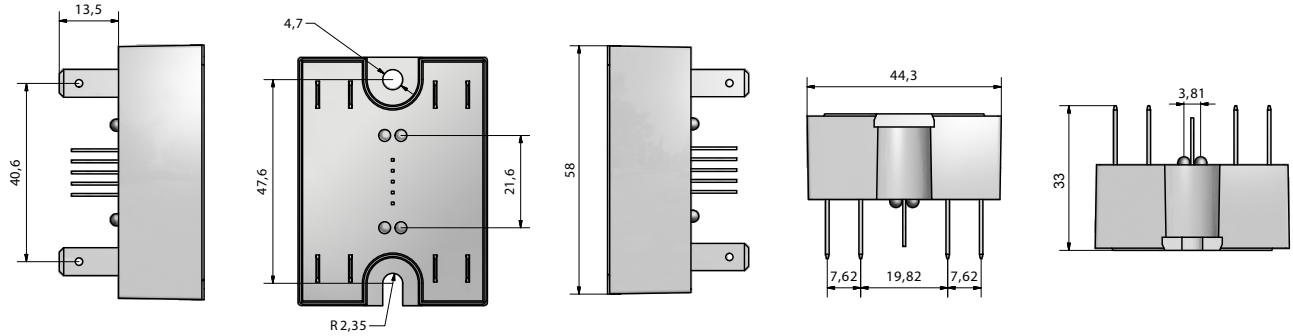
ENVIRONMENTAL DATA

SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
-	Vibration (Test conducted in accordance with the Vibration Environmental Testing Guidelines of the International Standard *IEC 60068-2-6)*	5-100Hz	Nominal	10	g
-	Shock (Test conducted in accordance with the Shock Environmental Testing Guidelines of the International Standard *IEC 60068-2-27*)	11ms	Nominal	50	g
-	Ambient Temperature - Operating (Working)[4]	No icing, no condensation	Maximum	100 (212)	°C (°F)
			Minimum	-40 (-40)	°C (°F)
-	Ambient Temperature - Storage	No icing, no condensation	Maximum	100 (212)	°C (°F)
			Minimum	-40 (-40)	°C (°F)
HR	Relative Ambient Humidity (Per international standard *IEC/EN 60068-2-78*)	Non-condensing @ 40 °C	Nominal	40 to 85	%
-	Pollution Degree	Non-conductive pollution with condensation possibilities	Nominal	2	

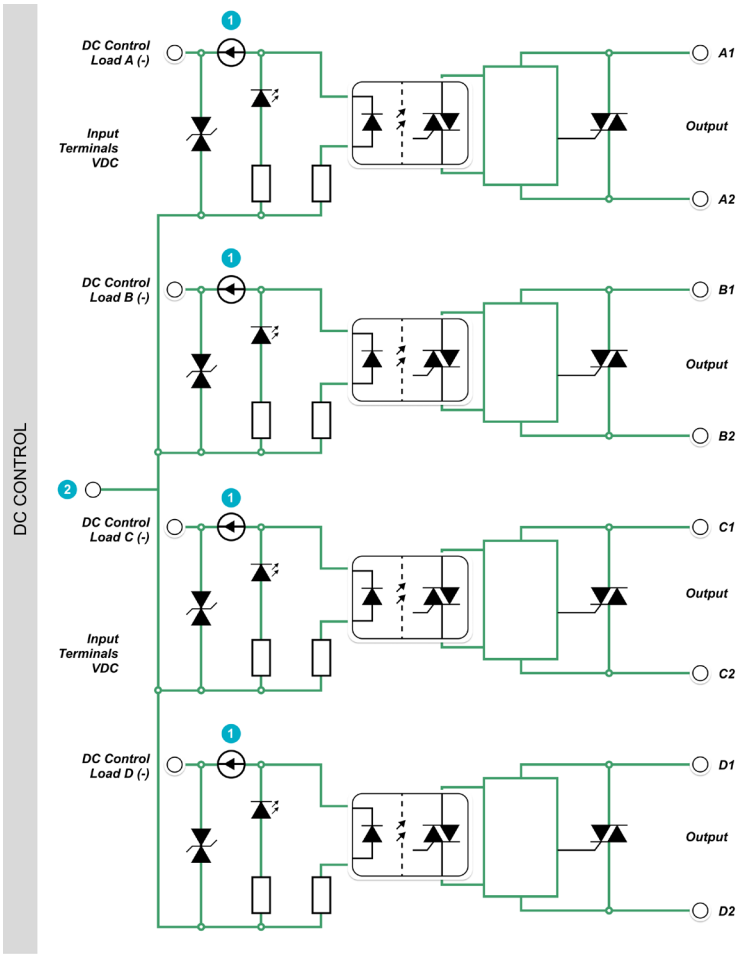
MECHANICAL DATA

SYMBOL	PARAMETER	CONDITION	RANGE	VALUE	UNIT
-	Product Weight	-	Typical	90	g (lbs)
-	Housing Material (In accordance with the American Standard UL- 94 for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances)	-	-	Plastic UL 94 V-0	-
-	Encaptuslation	-	-	Thermally Conductive Epoxy	-
-	Baseplate Material	-	-	Aluminum	-
-	Touch Protection Level (Test conducted in accordance with the IP Code of Degrees of Protection Testing Guidelines of the International Standard IEC 60529)	-	-	IP20	-
-	Terminals	Input/Output	Input	0.025" Square Pins	-
			Output	0.25" Fastons	
-	Screw Torque Range	SSR Mounting	Minimum	1.2 (11)	Nm (in-lb)
			Maximum	1.8 (16)	
-	Screw Thread Size	SSR Mounting	-	M4 x 12mm or #8-32 Pan Head	-

Product Dimensions (Millimeters)



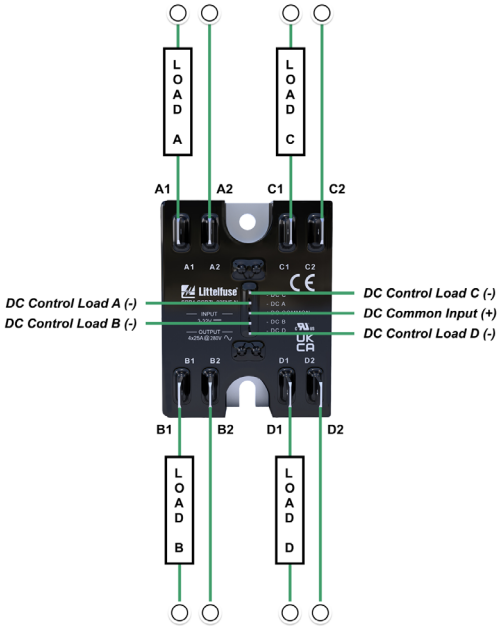
Equivalent Circuit Block Diagram



1 *Current Limiter*

2 *DC Common Input (+)*

Wiring Diagram



Short-Circuit Protection by Fuse

To safeguard solid-state relays (SSRs) against load short circuits, the use of fuses is essential, especially fast-acting ones. Here are the key considerations:

- Fuse Selection: The I^2t value (energy withstand capability) of the fuse should be less than half of the I^2t value of the relay. Standard fuses are inadequate because they cannot react swiftly enough to prevent fault currents from exceeding the maximum levels that thyristors (used in SSRs) can handle. Therefore, we strongly recommend employing ultra-fast fuses.
- Fuse Placement: Position the fuse in front of the SSR in the circuit. This strategic placement ensures that if the relay must unexpectedly break the earth insulation (due to overheating, case damage, or leakage with the heatsink), the fuse will protect the entire circuit from firing.
- Resource for Fuse Options: For the most suitable fuse options, consider checking the **Littelfuse website.**

Standards Conformity & Certifications

Product Safety Certifications

Products tested, compliant and certified to the following standards that states the requirements for electrical products to ensure they are safe for consumers to use.

CERTIFICATION BODY MARK	CERTIFICATION BODY NAME	CERTIFICATION DESCRIPTION	STANDARDS COVERED BY THE CERTIFICATION
c UL us No. E183688	cЯUus	North American certificate of compliance with the Safety requirements for Industrial Control Equipment	**UL508** American Standard of Safety for Industrial Control Equipment. **CAN/CSA C22.2 No.14-18** Canadian Standard of Safety for Industrial Control Equipment.
CE	CE	Conformity with the European safety, health, and environmental protection requirements.	**LVD Directive 2014/35/EU** EU Directive of Safety for Low Voltage Gear Equipment. In accordance with the Low Voltage Gear Testing Guidelines of the International Standard IEC 60947-4-3 **EMC Directive 2014/30/EU** EU Directive of Electromagnetic Compatibility. In accordance with the Low Voltage Gear Testing Guidelines of the International Standard IEC 60947-4-3 **RoHS Directive 2015/863/EU** EU Directive of Hazardous Substances Restriction. In accordance with the Assessment of electrical and electronic products with respect to the restriction of Hazardous substances Guidelines of the International Standard IEC 63000
UK CA	UKCA	Conformity with the UK product safety regulations	**SI 1101** UK Regulations of Safety for Electrical Equipment. In accordance with the Low Voltage Gear Testing Guidelines of the International Standard IEC 60947-4-3 **SI 1091** EU Directive of Electromagnetic Compatibility. In accordance with the Low Voltage Gear Testing Guidelines of the International Standard IEC 60947-4-3 **SI 3032** EU Directive of Hazardous Substances Restriction. In accordance with the Assessment of electrical and electronic products with respect to the restriction of Hazardous substances Guidelines of the International Standard IEC 63000

EMC Compliance (Electro-magnetic compatibility)

Radiated Emissions

-	STANDARD NAME	STANDARD DESCRIPTION	STANDARD NUMBER	LEVELS
IEC	Radiated RF	Radio interference field emission (radiated)	International Standard CISPR 11	Class B: 30M – 1GHz
IEC	Conducted RF	Radio interference voltage emissions (conducted)	International Standard CISPR 11	Class B (with external filter): 150k – 30MHz

Immunity

-	STANDARD NAME	STANDARD DESCRIPTION	STANDARD NUMBER	LEVELS
IEC	ESD	Immunity to Electrostatic Discharge (ESD)	International Standard IEC 61000-4-2	Level 3 -Contact Discharge: 6 kV -Air Discharge: 8 kV
IEC	Radiated RF	Immunity to Radiated Radio Frequency	International Standard IEC 61000-4-3	-Level 3: 10 V/m (80MHz-2GHz) -Level 2 3 V/m (2GHz-6GHz)

IEC	Burst	Immunity Electrical Fast Transients (Burst)	International Standard IEC 61000-4-4	Level 3: 2 kV
IEC	Surge	Immunity to Electrical Surges	International Standard IEC 61000-4-5	Level 3: -Line to line: 1 kV -Line to ground: 2 kV
IEC	Conducted RF	Immunity to Conducted Radio Frequency	International Standard IEC 61000-4-6	Level 3: 10V/m (0.15 - 80 MHz)
IEC	Dips	Immunity to Voltage Dips	International Standard IEC 61000-4-11	-0% for 0.5, 1 cycle, Performance Criteria A -40% for 10/12 cycles, Performance Criteria A -70% for 25/30 cycles, Performance Criteria A -80% for 250/300 cycles, Performance Criteria A
IEC	Interruptions	Immunity to Voltage Interruptions	International Standard IEC 61000-4-11	0% for 250/300 cycles, Performance Criteria B

While these products are designed to meet high industrial standards for Class A equipment, ensuring robust performance in demanding environments, they may cause radio interference when used in domestic settings. To mitigate this, additional noise reduction measures, such as filters or shielding, may be necessary. Ensure that the entire setup where the SSR is installed complies with all relevant EMC regulations required by the application.

Environmental Compliance[5]

Products comply to the following environmental standard requirements for electrical products to ensure they are safe for consumers to use.

-	STANDARD NAME	STANDARD DESCRIPTION	STANDARD NUMBER
RoHS	RoHS	Conformity with the European Restriction of Hazardous Substances in electrical and electronic products	European Directive 2015/863/EU (IEC 63000)
REACH	REACH	Conformity with the Registration, Evaluation, Authorization and Restriction of Chemicals regulation to ensure safe use of chemicals	European Directive 1907/2006
WEEE	WEEE	Conformity with the Waste Electrical and Electronic Equipment regulation to ensure proper disposal and recycling of e-waste	Regulation 2002/96/EC

Notes:
1. All parameters at 25 °C unless otherwise specified.
2. CE declared up to 230 V.
3. All parameters at 50% power rating and 100% duty cycle.
4. AC input option minimum operating temperature is -40 (-40).
5. The environmental compliance data reflects the most current information available and adheres to our rigorous standards for quality and sustainability. These specifications are valid from the product's initial release and are subject to change with ongoing improvements.

Warning Information

Caution: Material Damage, Electric Shock, and Arc Flash Hazard. Before installing or working with this product, take the following precautions:
1. **Disconnect all power:** Ensure that all power sources are disconnected.
2. **Verify connections:** Double-check all connections.

Failure to adhere to these instructions may lead to **serious injury or damage** of equipment.

Accessories

IMAGE	CATALOG #	TYPE	DESCRIPTION
	SADH-C1N600	DIN Rail Adapter	Allows SSR to be mounted on a 35 mm DIN type rail. It has a 6ºC/W Thermal Resistance
	C103PM	DIN Rail	35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.
	SADH-NN210	Heatsink	2.1ºC/W Thermal Resistance
	SADH-NN175	Heatsink	1.75ºC/W Thermal Resistance
	SADH-NN120	Heatsink	1.2ºC/W Thermal Resistance
	SADH-NN100	Heatsink	1.0ºC/W Thermal Resistance
	SADH-NN050	Heatsink	0.5ºC/W Thermal Resistance
	SADH-ND030	Heatsink	0.3ºC/W Thermal Resistance, 24 VDC
	SADH-NA030	Heatsink	0.3ºC/W Thermal Resistance, 230 VAC
	SANT-C1NM40	Mounting Screws	Screw Kit for heatsink mounting
	SANP-C1N030	Thermal Interface	Thermal Pad (Usable for 1 relay)
	SANG-CNN090	Thermal Interface	Heat Sink Thermal Paste 20 ml (Usable for 60+ relays)
	P0200-20	Thermal Interface	Heat Sink Compound 100 grams (Usable for 50+ relays)
	P0200-19	Thermal Interface	Heat Sink Compound 2 grams (Usable for 1 relay)